APPENDIX 5

D-R-A-F-T
ENGINEERING APPENDIX
BIG LAKE ECOSYSTEM RESTORATION STUDY

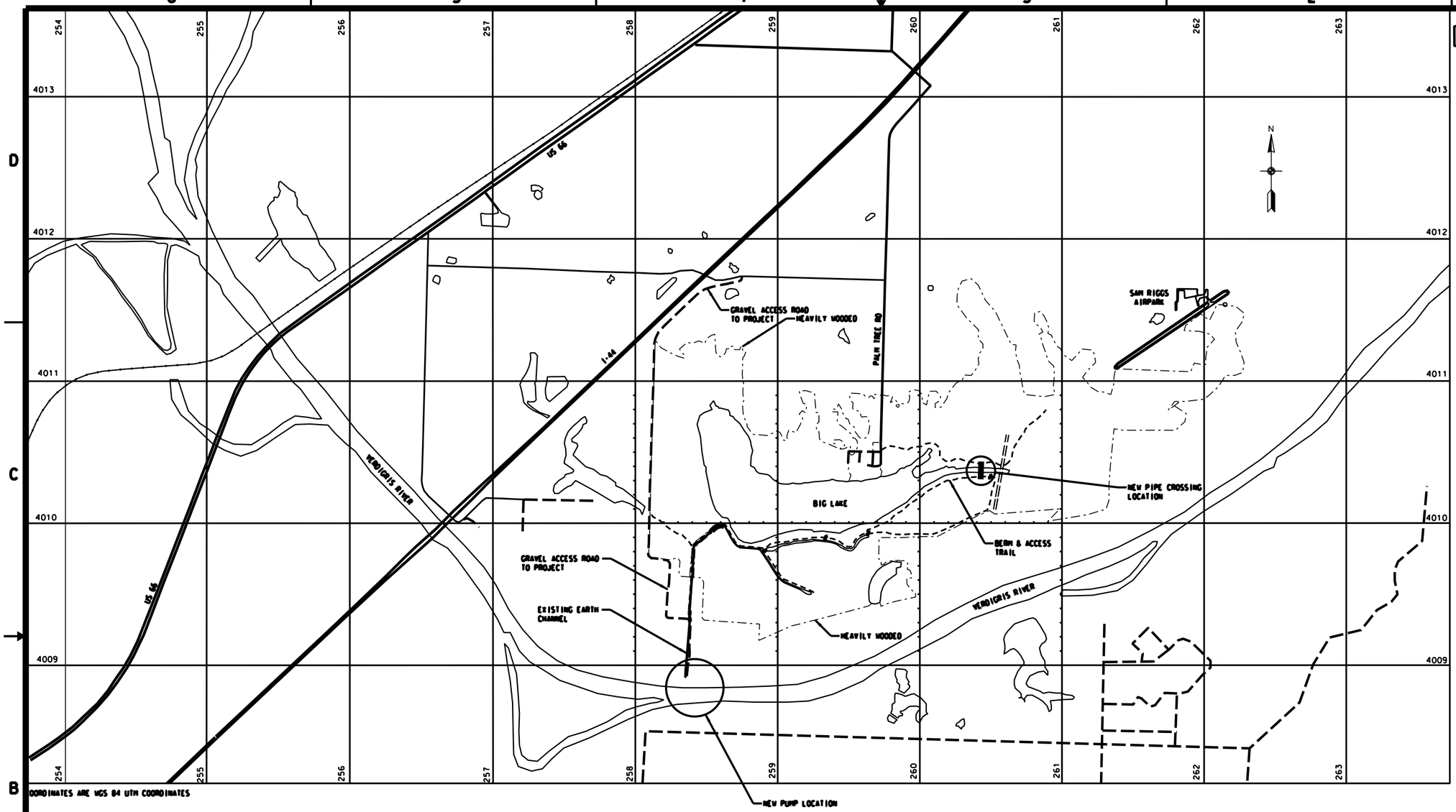
PROJECT DESCRIPTION

Location. The project is located as shown on the vicinity map drawing number 1/1.

Description of Work. All work will be performed as shown on the following drawings, shown here as embedded portable document format. Work shall include excavation along the north bank of the Verdigris River as required to set a pump house with pumps pre-anchored; clearing and deepening an existing earthen ditch for about 530 feet, extending two ditches for about 300-feet each and placing 325-feet of 24-inch pipe under the east end of Big Lake. Provide and install two pumps capable of 2500 gpm each at 35-feet of head. The pumps shall be located in a prefabricated concrete pump house. Pumps, pump house, and associated piping shall match existing (see drawings 12/3 and 12/4). Existing pumps are Godwin CD 250M Dri-Prime. The existing ditch located between grid coordinates 258411 4009847 to grid coordinate 258536 4009945 is a flat "V" ditch. Widen existing ditch along the existing flow line center to a width of 9-feet, with 3H:1V side slopes. Place and compact excavated material on the lake side adjacent to the ditch. The two 300-foot long ditches shown on the drawings (see drawing 12/1 and 12/2) will be constructed through heavily wooded areas. Remove trees only as necessary to construct the ditches. Avoid large oak trees where possible. Trees may be hauled to a designated location and burned on site id local laws permit. For the west ditch located between grid coordinates 258536 4009945 to grid coordinate 258624 4009978, continue the grade line from widening the 530-foot ditch. Place and compact excavated material on the lake side adjacent to the new ditch. For the east ditch located between grid coordinates 259640 4009939 to grid coordinate 259719 4009972, begin the ditch flow line at the existing downstream invert of the existing culvert. Route the ditch through the wooded area, clearing trees only as necessary to construct the ditch. Place and compact excavated material on the lake side adjacent to the new ditch. Slope the ditches to flow from west to east as possible. The 24-inch diameter pipe that will be placed under water at the east end of the lake will be connected between a control structure to be located on the land side of the berms running along the north and south sides of the lake. The top of the pipe shall be at or below the lake bottom. Construct an underwater trench to plane the pipe. The pipe shall be anchored or weighted to insure that the pipe does not float. Drawing 12/2 shows one method to anchor the pipe. The contractor may propose an alternative method. The top of the system shall not be higher that the bottom of the lake.

Tree planting will be done as in-kind services by the project's cost sharing sponsor. 1,000 trees will be planted by hand over a 50-acre are of the BL3. The trees will be a mix of native species such as water oak, willow oak and pin oak. The trees will be planted in a random pattern among the existing trees.

Construction Period. Construction should be completed within 60 days after the pumps and pump house are delivered to the site.



INDEX OF DRAWINGS

SYMBOL	DESCRIPTION	DATE	APPR

Tulsa District
Tulsa, Oklahoma

US Army Corps of Engineers

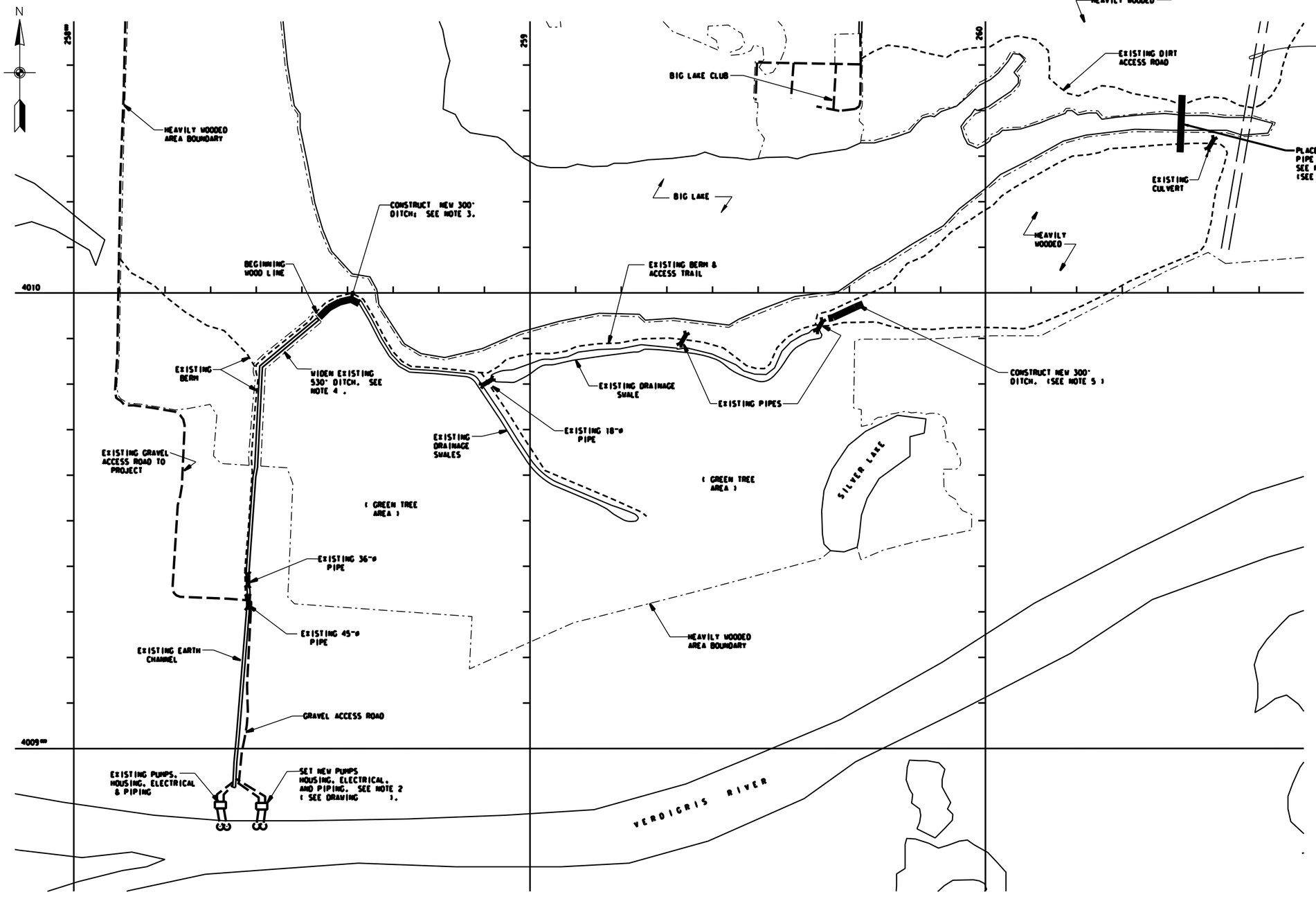
DESIGNED BY: R BEAUCHAMP
DRAWN BY: R BEAUCHAMP
REVIEWED BY:
SUBMITTED BY: MARK BURKHOLDER CHIEF, CIVIL SECTION
PLOT SCALE: 1000:1
DESIGN FILE: 01 01.DGN
PLOT DATE: JUL 2005

VERDIGRIS RIVER VERDIGRIS, OKLAHOMA

BIG LAKE ECOSYSTEM RESTORATION VERDIGRIS, OKLAHOMA

INDEX OF DRAWINGS
VICINITY MAP
PROJECT LOCATION MAP

DWG. CODE:
CONTRACT DATE:
INVITATION NO. DACW56- -B-
CONTRACT NO. DACW56- -C-
SHEET OF
SHEET REFERENCE NUMBER 1/1



PLAN VIEW

300 0 300 600

SCALE OF FEET

NOTES:

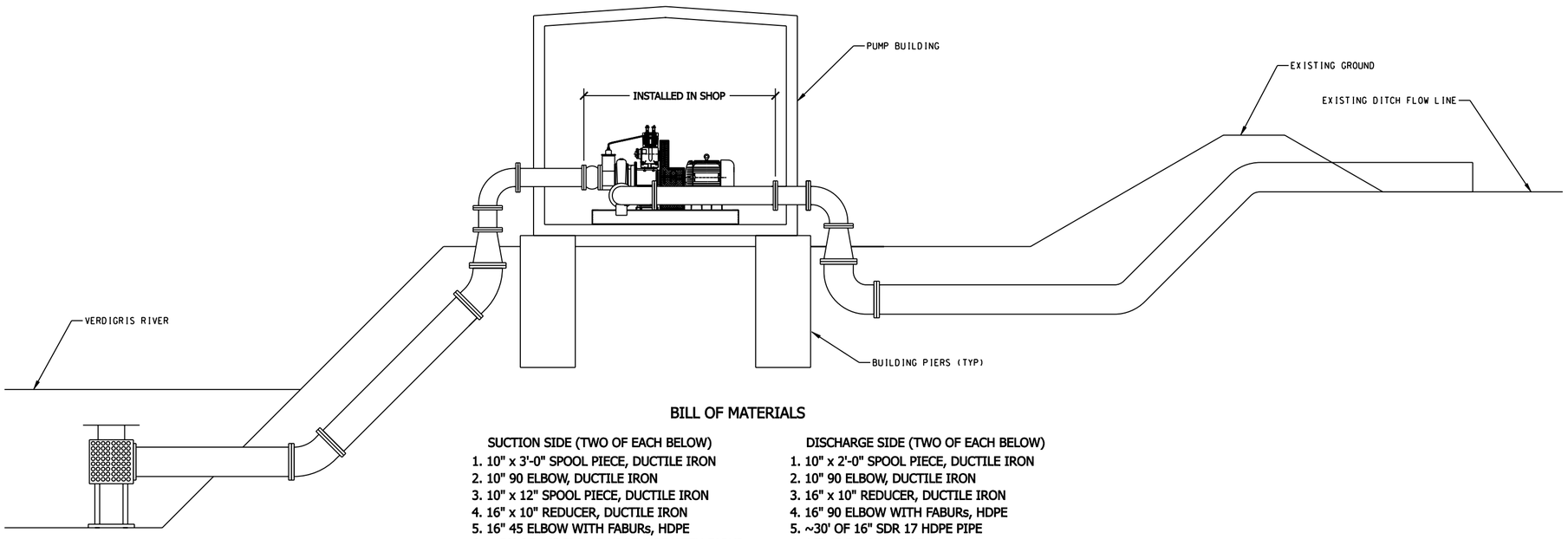
1. COORDINATES ARE WGS 84 UTM. GRID LINES ARE APPROXIMATE.
2. THE BIG LAKE CLUB HAS SET TWO GODWIN CD225 PUMPS WITHIN A PRECAST CONCRETE BUILDING. THE PUMPS HAVE SUCTION LINES THAT ARE FED FROM THE VERDIGRIS RIVER. THE WATER IS PUMPED INTO AN EXISTING EARTH CHANNEL AND THEN GRAVITY-FED THROUGH OUT THE HEAVILY WOODED GREEN AREAS. THIS CONTRACT REQUIRES INSTALLING IDENTICAL PUMPS, HOUSING, ELECTRICAL, AND PIPING ON A PREPARED EXCAVATED BASE ON THE RIVER BANK. SEE DRAWING .. FOR DETAILS.
3. CONSTRUCT A SHALLOW EARTH DITCH APPROXIMATELY 300' LONG BEGINNING AT THE WOOD LINE. REMOVE EXISTING TREES AS REQUIRED TO CONSTRUCT THE DITCH. CONNECT THE DITCH TO EXISTING SWALE. SEE DRAWING 12/2 .
4. WIDEN EXISTING EARTH DITCH. APPROXIMATELY 530'. SEE DRAWING 12/2.
5. CONSTRUCT NEW DITCH. APPROXIMATELY 300' LONG BEGINNING AT PIPE CULVERT OUTLET. REMOVE EXISTING TREES AS REQUIRED TO CONSTRUCT DITCH. SEE DRAWING 12/2.
6. PLACE NEW 24"ø PIPE UNDER THE LAKE WATER SURFACE. THE TOP OF THE PIPE SHALL BE AT THE SAME ELEVATION AS THE BOTTOM OF THE LAKE. THE WATER DEPTH AT THIS LOCATION IS APPROXIMATELY 1.5'. SEE DRAWING 12/2.
7. GREEN AREAS ARE HEAVILY WOODED.

SYMBOL	DESCRIPTION	DATE	APPR

Tulsa District
Tulsa, Oklahoma

US Army Corps of Engineers

DESIGNED BY: R BEAUCHAMP	VERDIGRIS RIVER	VERDIGRIS, OKLAHOMA	
DRAWN BY: C DEAN	BIG LAKE ECOSYSTEM RESTORATION VERDIGRIS, OKLAHOMA		
REVIEWED BY:	PROJECT PLAN		
SUBMITTED BY: MARK BURKHOLDER CHIEF, CIVIL SECTION			
PLOT SCALE:	DWG. CODE:	CONTRACT DATE:	SHEET REFERENCE NUMBER
DESIGN FILE: 12_01.DGN		INVITATION NO. DACW56- -B-	
PLOT DATE: JUN 2005	SHEET OF	CONTRACT NO. DACW56- -C-	12/1



BILL OF MATERIALS

SUCTION SIDE (TWO OF EACH BELOW)

1. 10" x 3'-0" SPOOL PIECE, DUCTILE IRON
2. 10" 90 ELBOW, DUCTILE IRON
3. 10" x 12" SPOOL PIECE, DUCTILE IRON
4. 16" x 10" REDUCER, DUCTILE IRON
5. 16" 45 ELBOW WITH FABURs, HDPE
6. ~ 50' OF 16" SDR 17 HDPE PIPE WITH FABURs
7. 16" 45 ELBOW WITH FABURs, HDPE
8. ~10' OF 16" SDR 17 HDPE PIPE WITH FABURs
9. 16" STRAINER WITH STUDS

DISCHARGE SIDE (TWO OF EACH BELOW)

1. 10" x 2'-0" SPOOL PIECE, DUCTILE IRON
2. 10" 90 ELBOW, DUCTILE IRON
3. 16" x 10" REDUCER, DUCTILE IRON
4. 16" 90 ELBOW WITH FABURs, HDPE
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9. ~10' OF 16" SDR 17 HDPE PIPE

BIG LAKE HUNTING CLUB - TULSA, OK
PUMPHOUSE MODEL 1220.5000.35

Heartland Pump Rental & Sales, Inc.
1800 Supply Road, Suite A
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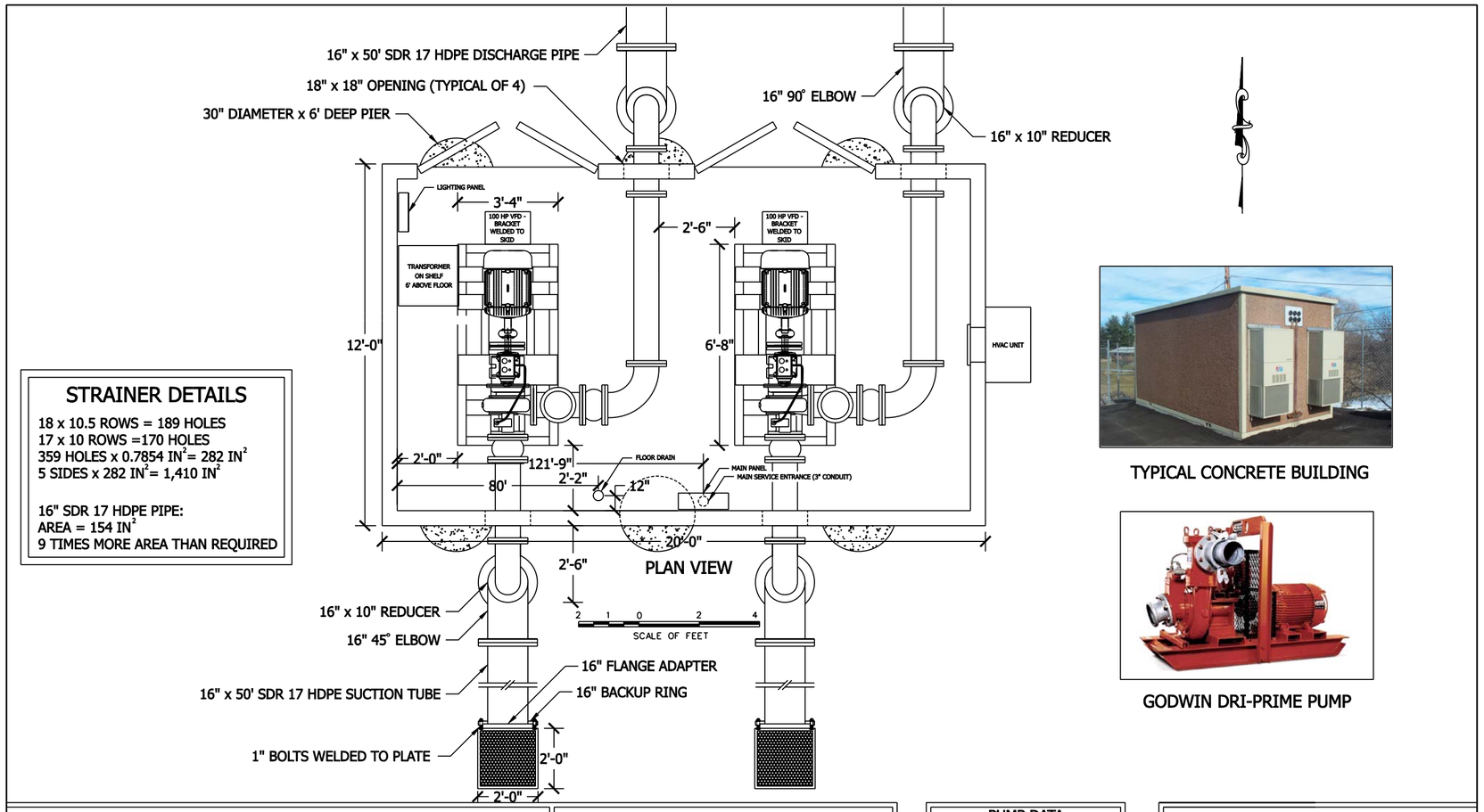
888.272.7143 • Fax: 618.985.5108
E-Mail: pumps@heartlandpump.com

SYMBOL	DESCRIPTION	DATE	APPR

Tulsa District
Tulsa, Oklahoma

US Army Corps
of Engineers

DESIGNED BY:	VERDIGRIS RIVER		VERDIGRIS, OKLAHOMA
DRAWN BY:	BIG LAKE ECOSYSTEM RESTORATION VERDIGRIS, OKLAHOMA		
REVIEWED BY:	PUMP SYSTEM SECTION		
SUBMITTED BY: MARK BURKHOLDER CHIEF, CIVIL SECTION			
PLOT SCALE: SCALE: 1" = 3'	DWG. CODE:	CONTRACT DATE:	SHEET REFERENCE NUMBER
DESIGN FILE: 12-04.DGN		INVITATION NO. DACW56- -B-	12/4
PLOT DATE: JUL 2005	SHEET OF	CONTRACT NO. DACW56- -C-	



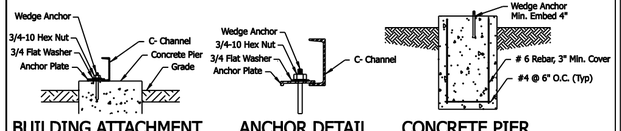
STRAINER DETAILS

18 x 10.5 ROWS = 189 HOLES
17 x 10 ROWS =170 HOLES
359 HOLES x 0.7854 IN^2 = 282 IN^2
5 SIDES x 282 IN^2 = 1,410 IN^2

16" SDR 17 HDPE PIPE:
AREA = 154 IN^2
9 TIMES MORE AREA THAN REQUIRED

TYPICAL CONCRETE BUILDING

GODWIN DRI-PRIME PUMP



BUILDING ATTACHMENT | ANCHOR DETAIL | CONCRETE PIER

ANCHORING NOTES

1. SITE GRADING SHALL DIRECT WATER AWAY FROM BUILDING.
2. FOOTING DESIGN BASED ON SOIL WITH A MINIMUM BEARING CAPACITY OF 2,000 PSF. ENGINEER RESPONSIBLE FOR VERIFICATION OF LOCAL SOIL DATA.
3. ONLY THE PIER LAYOUT HEREON IS APPROVED BY MANUFACTURER. DO NOT DEVIATE WITHOUT PRIOR APPROVAL.

PUMP DATA

Service: 460 V, 3 Phase, 60 Cycle
Type: Godwin CD 250M Dri-Prime
Size: 10" x10"
Design: 2,500 GPM at 35' TDH

UPDATED PANELS AND PIERS
6/21/05

BIG LAKE HUNTING CLUB - TULSA, OK
PUMPHOUSE MODEL 1220.5000.35

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Tulsa District
Tulsa, Oklahoma

US Army Corps of Engineers

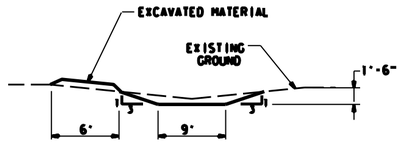
DESIGNED BY:
DRAWN BY:
REVIEWED BY:
SUBMITTED BY:
MARK BURKHOLDER
CHIEF, CIVIL SECTION

VERDIGRIS RIVER VERDIGRIS, OKLAHOMA

BIG LAKE ECOSYSTEM RESTORATION
VERDIGRIS, OKLAHOMA

PUMP HOUSE

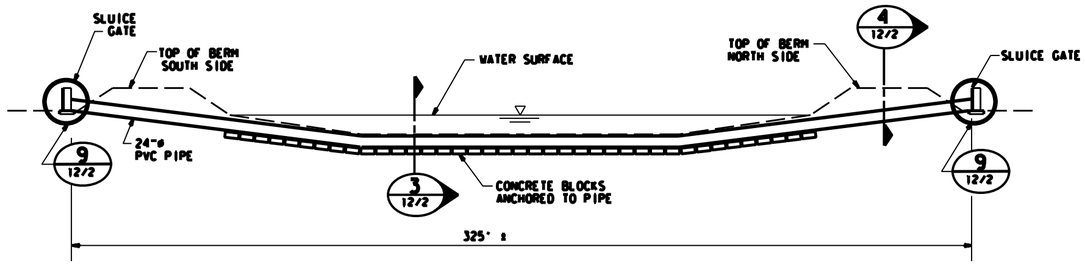
PLOT SCALE:
ENG. CODE:
CONTRACT DATE:
SHEET REFERENCE NUMBER
12/13
DESIGN FILE: 12-03.DGN
INVITATION NO. DACW56- -B-
PLOT DATE: JUL 2005
SHEET OF
CONTRACT NO. DACW56- -C-



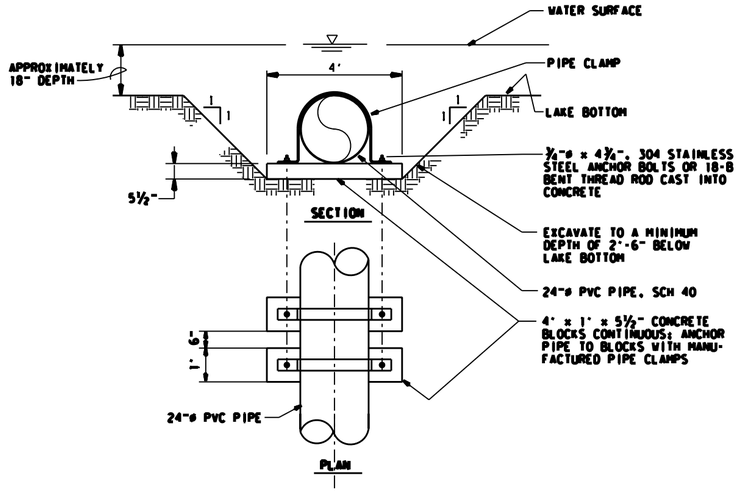
TYPICAL DITCH SECTION 1 12/2

DITCH SECTION NOTES:

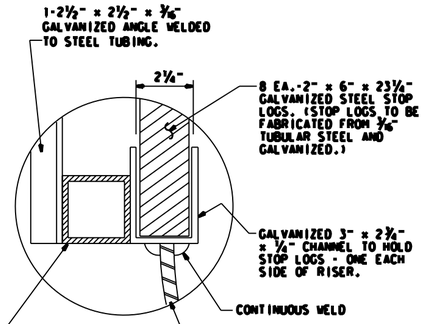
1. EXCAVATED MATERIAL SHALL BE PLACED ON THE LAKE SIDE, SPREAD, AND COMPACTED.
2. BEGIN DITCH AT EXISTING GROUND ELEVATION.
3. DITCH FLOW LINE (BOTTOM OF DITCH) SHALL FOLLOW EXISTING GRADE AND WHERE POSSIBLE SLOPED FROM WEST TO EAST.
4. TAPER EAST END OF DITCH FOR 5' UP TO EXISTING GRADE.



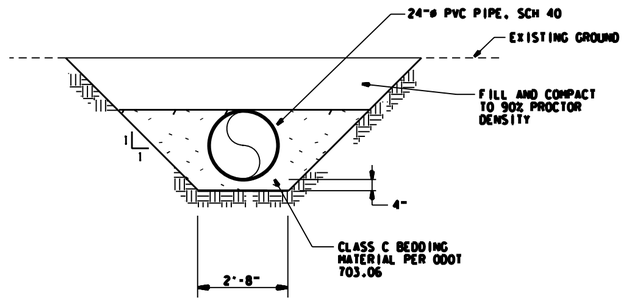
PIPE CROSSING PROFILE 2 12/2



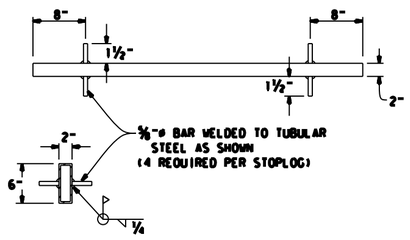
PIPE ANCHOR DETAIL 3 12/2



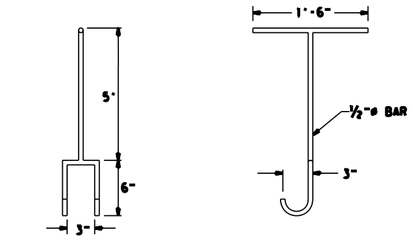
DETAIL 5 12/2



PIPE BURIAL SECTION 4 12/2

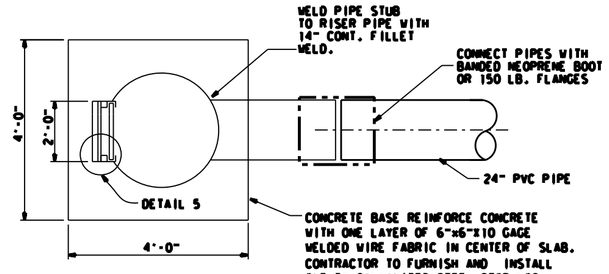


STEEL STOPLOG DETAIL 6 12/2

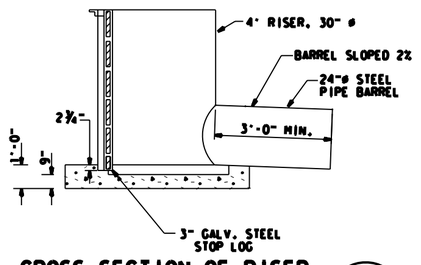


LIFTING HOOK DETAIL 7 12/2

2 REQUIRED



TOP VIEW 8 12/2



CROSS SECTION OF RISER 9 12/2

RISER

4 FT. OF 30 IN. DIAMETER OF 0.375 INCH THICK WELDED STEEL (36" MAX.).

BARREL

3 FT. OF 24 IN. DIAMETER 0.375 INCH THICK WELDED STEEL (36" MAX.).

BASE

CONCRETE 0.6 CU. YDS.

SYMBOL	DESCRIPTION	DATE	APPR

Tulsa District Tulsa, Oklahoma

US Army Corps of Engineers

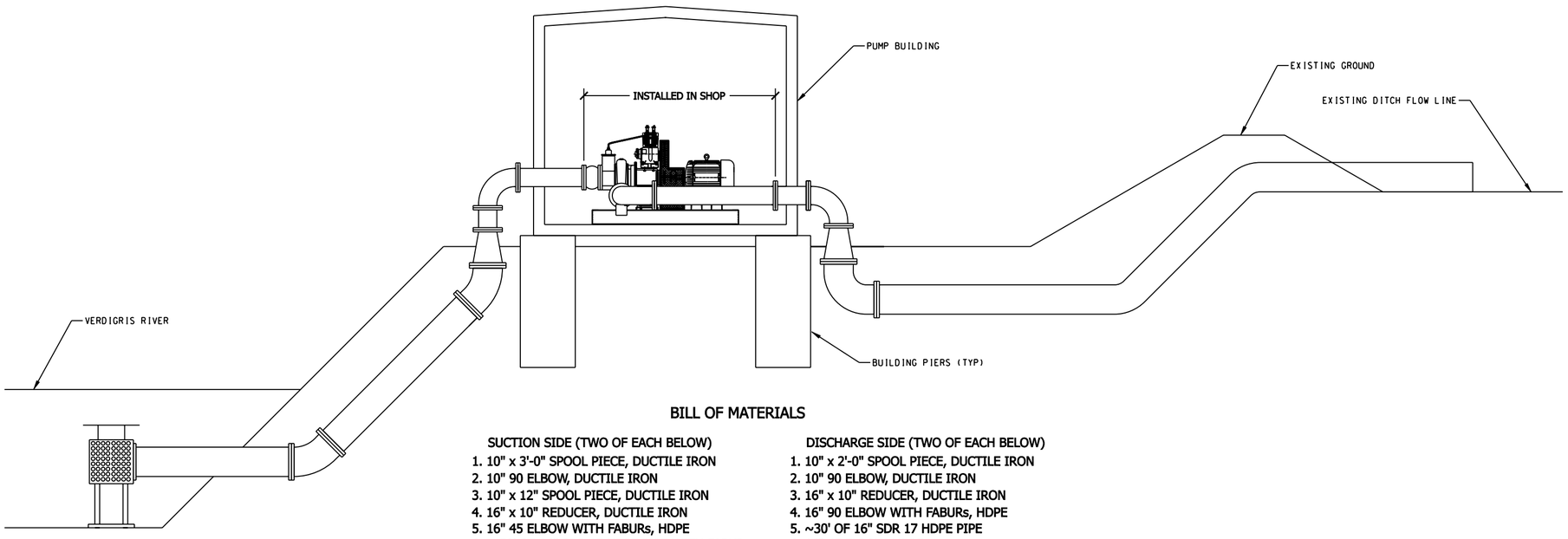
DESIGNED BY: R. BEAUCHAMP
DRAWN BY: C. DEAN
REVIEWED BY:
SUBMITTED BY: MARK BURKHOLDER CHIEF, CIVIL SECTION
PLOT SCALE:
DESIGN FILE: 12-02.DGN
PLOT DATE: JUL 2005

VERDIGRIS RIVER VERDIGRIS, OKLAHOMA

BIG LAKE ECOSYSTEM RESTORATION VERDIGRIS, OKLAHOMA

DETAILS

DWG. CODE:
CONTRACT DATE:
INVITATION NO. DACW56- -B-
CONTRACT NO. DACW56- -C-
SHEET OF
SHEET REFERENCE NUMBER 12/2



BILL OF MATERIALS

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SYMBOL	DESCRIPTION	DATE	APPR

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Tulsa, Oklahoma

US Army Corps
of Engineers

DESIGNED BY:	VERDIGRIS RIVER		VERDIGRIS, OKLAHOMA
DRAWN BY:	BIG LAKE ECOSYSTEM RESTORATION VERDIGRIS, OKLAHOMA		
REVIEWED BY:	PUMP SYSTEM SECTION		
SUBMITTED BY: MARK BURKHOLDER CHIEF, CIVIL SECTION			
PLOT SCALE: SCALE: 1" = 3'	DWG. CODE:	CONTRACT DATE:	SHEET REFERENCE NUMBER
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PLOT DATE: JUL 2005	SHEET OF	CONTRACT NO. DACW56- -C-	